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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD L. SUTHERLAND,
JOHN SAPPINGTON, DONNA M. BRANDELIK,
CHRISTINA K. SHEPHERD (NEE WENDEL), AND
ROBERT T. POGUE

Appeal 2008-2215
Application 10/796,071
Technology Center 1700

Decided: June 30, 2008

Before CHUNG K. PAK, JEFFREY T. SMITH, and MICHAEL P.
COLAIANNI *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the
Examiner's final rejection of claims 49 through 90, all of the claims pending
in the above-identified application. We have jurisdiction pursuant to 35
U.S.C. § 6.

We AFFIRM.

STATEMENT OF THE CASE

The subject matter on appeal is directed to a method and system for duplicating a hologram, which is an image or pattern that is formed in a recording medium. According to Appellants, the recording mediums used in forming the hologram and its replica are composed of a polymer dispersed liquid crystal (hereinafter "PDLC") material having an electrically controllable variable diffraction efficiency material. (Spec. 8). This PDLC material is desirable because it allows holograms having "highly complex optical geometries, [e.g., computer generated holograms, to be] duplicate[ed] without the need for multiple beam power/intensity balancing and long recording times." *Id.* at 4.

Appellants show in Figures 3 and 4 two different ways of providing the claimed optical contact between the hologram and the recording substrate. Figures 3 and 4 are reproduced below:

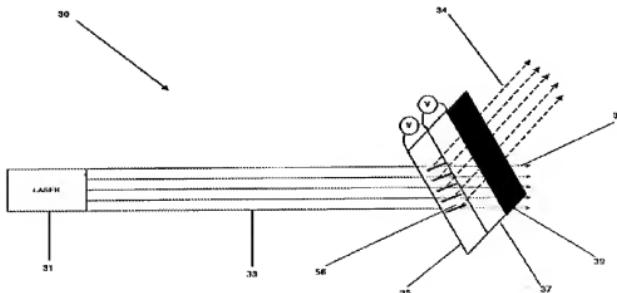


Figure 3

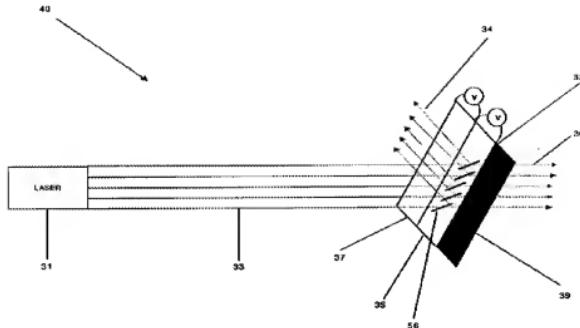


Figure 4

Appellants' Figure 3 relates to a transmission reproduction system 30 because the diffracted beam 34 is transmitted through the master hologram 35 and optically contacts the PDLC blank 37 (blank recording substrate) positioned behind the master hologram 35 to provide a copy of the master hologram thereon. Figure 4 relates to a reflection reproduction system 40 because the diffracted beam 34 is reflected by the master hologram 35 and optically contacts the PDLC blank 37 (blank recording substrate) positioned in front of the master hologram 35 to produce a copy of the master hologram thereon.

Further details of the appealed subject matter are recited in representative claims 49, 60, 70, and 80, which are reproduced below:

49. A system for duplicating a hologram comprising:

- a radiation source for emitting a coherent beam of radiation;
- a hologram having an electrically controllable variable diffraction efficiency; and
- a recording substrate comprised of a polymer-dispersed liquid crystal material for recording a replica of the hologram having an electrically controllable variable diffraction efficiency therein, wherein the hologram and the recording substrate are in optical contact with one another and are placed in a path of the coherent beam of radiation.

60. A method of duplicating a hologram comprising:

- directing a coherent incident radiation beam at a first optical component;
- transmitting the coherent incident radiation beam through the first optical component forming a transmitted beam, to a second optical component having a hologram with an electrically controllable variable diffraction efficiency recorded therein; and
- diffracting the transmitted beam via the hologram forming a diffracted radiation beam, wherein the coherent incident radiation beam and the diffracted beam interfere within the first optical component to form a replica of the hologram having an electrically controllable variable diffraction efficiency therein.

70. A method for duplicating a hologram comprising:

- directing a coherent radiation beam at a first optical component having a hologram with an electrically controllable variable diffraction efficiency recorded therein;
- diffracting a first portion of the coherent radiation beam via the hologram forming a diffracted radiation beam;
- transmitting a second portion of the coherent radiation beam through the first optical component forming a transmitted beam; and
- interfering the diffracted radiation beam with the transmitted radiation beam within a second optical component to form

a replica of the hologram having an electrically controllable variable diffraction efficiency therein.

80. A system for duplicating a hologram comprising:
a radiation source for emitting a coherent beam of
radiation;
a hologram having an electrically controllable variable
diffraction efficiency; and
a recording substrate comprised of a polymer-
dispersed liquid crystal material for recording a replica of the
hologram having an electrically controllable variable diffraction
efficiency therein in a single step forming a photochemically cured
polymer matrix, wherein the hologram and the recording substrate are
in optical contact with one another and placed in a path of the
coherent beam of radiation; and
further wherein polymer-dispersed liquid crystal
material has an anisotropic spatial distribution of phase-separated
liquid crystal droplets within the photochemically cured polymer
matrix.

As evidence of unpatentability of the claimed subject matter, the
Examiner has relied upon the following references:

| | | |
|------------|-------------|----------------------------|
| Sturdevant | 3,667,946 | Jun. 6, 1972 |
| Ikeda | EP 0087281 | Aug. 31, 1983 |
| Chang | 4,818,045 | Apr. 4, 1989 |
| Margerum | 4,938,568 | Jul. 3, 1990 |
| Eguchi | JP 3-188479 | Aug. 16, 1991 ¹ |
| Wreede | 5,499,118 | Mar. 12, 1996 |
| Redfield | 5,529,861 | Jun. 25, 1996 |
| Sutherland | WO 98/04650 | Feb. 5, 1998 |

¹ Our reference to Eguchi is to the translation thereof prepared for the U.S. Patent and Trademark Office by Schreiber Translations Inc. (PTO 07-4887 June 2007).

H. J. Caulfield, *The Applications of Holography* 67-69 (Stanley S. Ballard ed., Wiley Interscience 1971) (hereinafter "Caulfield")

The Examiner has rejected the claims on appeal as follows:

- 1) Claims 49 though 90 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Chang, Ikeda, Sutherland, Margerum, and Caulfield;
- 2) Claims 49 through 90 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Chang, Ikeda, Sutherland, Margerum, Caulfield, Wreede, and Eguchi; and
- 3) Claims 49 through 90 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Caulfield, Sutherland, Margerum, Sturdevant, and Redfield.

Appellants appeal from the Examiner's decision rejecting the claims on appeal under 35 U.S.C. § 103(a)².

PRINCIPLES OF LAW, RELEVANT FACTUAL FINDINGS, ISSUES, AND ANALYSES

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level

² Appellants only argue claims 49, 60, 70, and 80. (App. Br. 7-16 and Reply Br. 1-2). Therefore, we choose claims 49, 60, 70, and 80 as the representative claims consistent with 37 C.F.R. § 41.37(c)(1)(vii) (2005).

of ordinary skill in the art; and (4) secondary considerations, if any. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). “[A]nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int'l. Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007).

Appellants do not dispute the Examiner's finding that both Caulfield and Ikeda individually teach a method and system for copying an original hologram's image or pattern formed in a recording medium onto another recording medium. (*Compare Ans. 4 and 6 with App. Br. 7-16 and Reply Br. 1-2*). Appellants also do not dispute the Examiner's finding that Sutherland teaches that a recording substrate (recording medium) is composed of a PDLC material having an electrically controllable variable diffraction efficiency. (*Compare Ans. 4 and 5 with App. Br. 7-16 and Reply Br. 1-2*). Appellants contend one of ordinary skill in the art would not have been led to modify the teachings of either Caulfield or Ikeda with Sutherland to arrive at the claimed invention. (*App. Br. 7-16 and Reply Br. 1-2*).

Thus, the dispositive question is whether one having ordinary skill in the art would have been led to employ Sutherland's recording medium as either Caulfield's or Ikeda's recording medium for an original hologram and a replica within the meaning of § 103. On this record, we answer this question in the affirmative.

As indicated *supra*, both Caulfield and Ikeda individually teach that an original hologram, which is an image on a recording medium, is copied

onto another blank recording medium. Indeed, Caulfield states (p. 67-68) that "multiple copies are useful for mass markets or uses, which might risk damage to the original. . . . copying is used to change from one recording medium to another . . . , copying can be used to change the hologram to a different form or to record a processed imaged."

Similarly, Ikeda states (p. 2 and 8) that the "predetermined pattern of interference fringes" formed on the master hologram plate (original hologram) is copied onto the copy hologram plate (recording medium). We find that Caulfield teaches that "[t]he most straightforward approach to copying a hologram is to copy it like any other transparency by projection printing or contact printing . . ." (p. 68). We find that Caulfield, like Appellants, then goes onto teach duplicating a hologram using either a transmission reproduction system or a reflection reproduction system using a radiation source for emitting a coherent beam of radiation. (*Compare* Caulfield, p. 68 *with* Spec., pp. 20 *and* 21). We find that, in either the transmission reproduction system or the reflection reproduction system, Caulfield's diffracted beam emanates from the original hologram and optically contacts a recording medium.

Although Caulfield or Ikeda does not explicitly identify any specific materials for the recording mediums used in forming the original hologram and its copy (replica), Sutherland teaches (pp. 1-3, 15, and 29) a recording substrate (recording medium) which can be made of a PDLC material having an electrically controllable variable diffraction efficiency. We find that Sutherland teaches (p. 16) that "[t]he polymer-dispersed liquid crystal

[PDLC] materials described herein successfully demonstrate the utility for recording volume holograms"

Given that any recording medium, inclusive of the one taught by Sutherland, can be used in forming an original hologram and a copy in Caulfield's or Ikeda's hologram copying process and system, we determine that one having ordinary skill in the art would have been led to use Sutherland's PDLC recording medium as either Caulfield's or Ikeda's recording medium for forming an original (master) hologram and its replica. Moreover, we determine that one of ordinary skill making such a combination would have a reasonable expectation of successfully obtaining the advantages stated in Sutherland in Caulfield's or Ikeda's hologram copying system and process.

ORDER

The decision of the Examiner is affirmed.

TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

tc

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